Check List the journal of biodiversity data

NOTES ON GEOGRAPHIC DISTRIBUTION

Check List 11(4): 1693, 14 July 2015 doi: http://dx.doi.org/10.15560/11.4.1693
ISSN 1809-127X © 2015 Check List and Authors

Distribution extension of *Adelpha melona pseudarete* Fruhstorfer, 1915 (Lepidoptera: Nymphalidae) with the first records for South Brazil

Gabriela Lourenço Leviski*, **Luziany Queiroz-Santos**, **Ricardo Russo Siewert**, **Lucy Mila Garcia Salik**, **Mirna Martins Casagrande** and **Olaf Hermann Hendrik Mielke**

Universidade Federal do Paraná, Departamento de Zoologia, Laboratório de Estudos de Lepidoptera Neotropical. Caixa Postal 19.020. CEP 81531-980. Curitiba, PR, Brazil

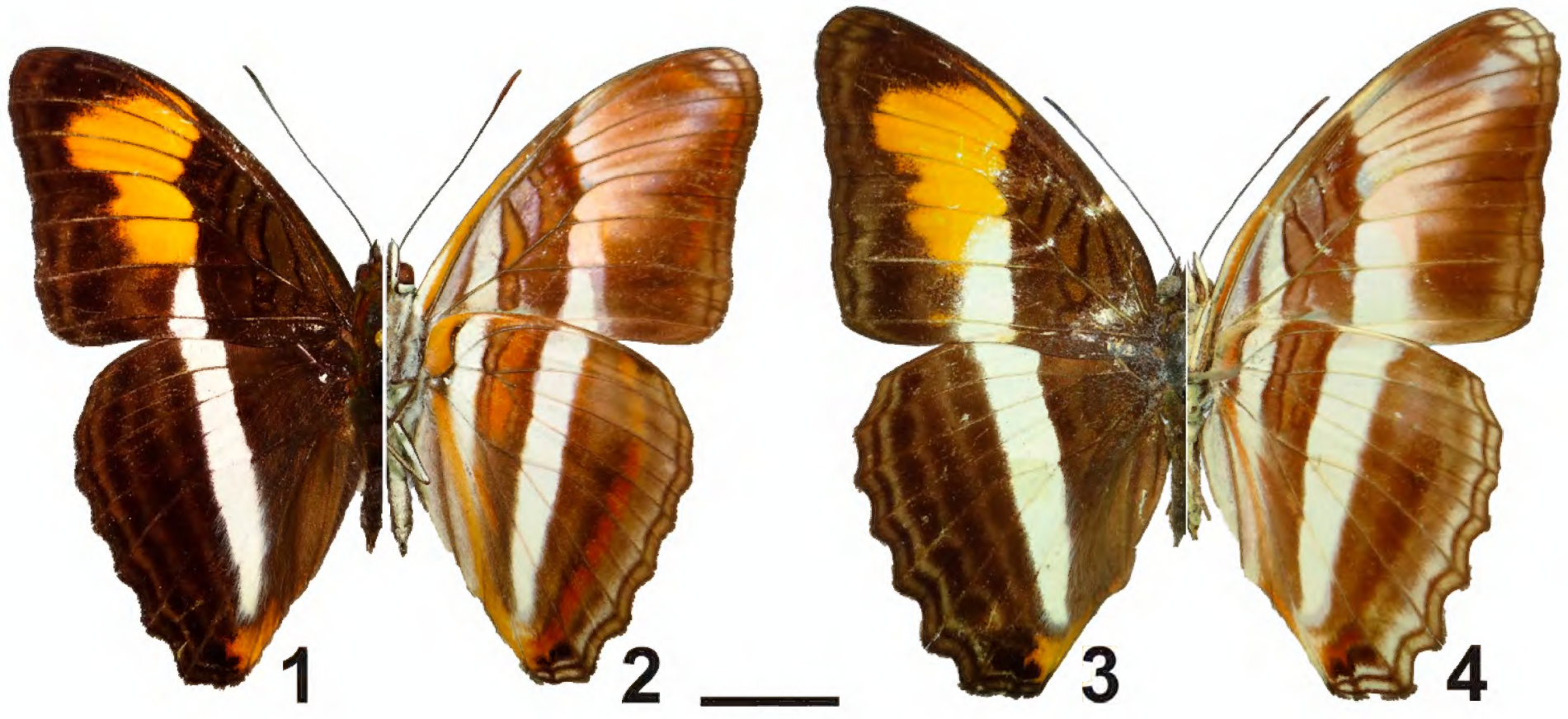
* Corresponding author. E-mail: gabriela.leviski@gmail.com

Abstract: *Adelpha melona pseudarete* is reported from 11 new records for south Brazil, which increases its distribution by about 900 km south from São Paulo. These new records are the most southern for this species.

Key words: Atlantic Forest, Limenitidinae, Papilionoidea

The genus *Adelpha* Hübner, 1819 (Nymphalidae: Limenitidinae) comprises 85 species and 174 known subspecies distributed throughout the Neotropics (Willmott 2003; Lamas 2004; Willmott and Hall 2013). Most *Adelpha* species are recorded in a range of different forested habitats from sea level to 3,000 m, especially in large sunlit patches (Willmott 2003). *Adelpha melona* contains five recognized subspecies: *A. m. melona* (Hewitson, 1847), *A. m. deborah* Weeks, 1901, *A. m. leucocoma* Fruhstorfer, 1915, *A. m. neildi* Willmott, 2003, and *A. m. pseudarete* Fruhstorfer, 1915. *A. m. pseudarete* (Figures 1–4) resembles most *A. m. melona,* but can be easily distinguished by the white post-discal band from CuA_2–2A and often from CuA_1–CuA_2 on the dorsal surface of forewings, while in *A. m. melona* this band is totally orange until the anal margin.

Until now, the geographic distribution of *A. m. pseudarete* was reported in Brazil from the states of Bahia (Morro do Chapéu), Espírito Santo (Linhares), Minas Gerais (Leopoldina), Rio de Janeiro (Rio de Janeiro) and São Paulo (Borhumi = [Bauru]); it has also been reported from Paraguay (Paraguari) and Argentina (Missiones province) (Willmott 2003). According to Willmott (2003), *A. m. pseudarete* is considered a rare



Figures 1–4. *Adelpha melona pseudarete* Fruhstorfer, 1915; male, dorsal (**1**) and ventral view (**2**); female, dorsal (**3**) and ventral view (**4**). Scale bar = 1 cm.

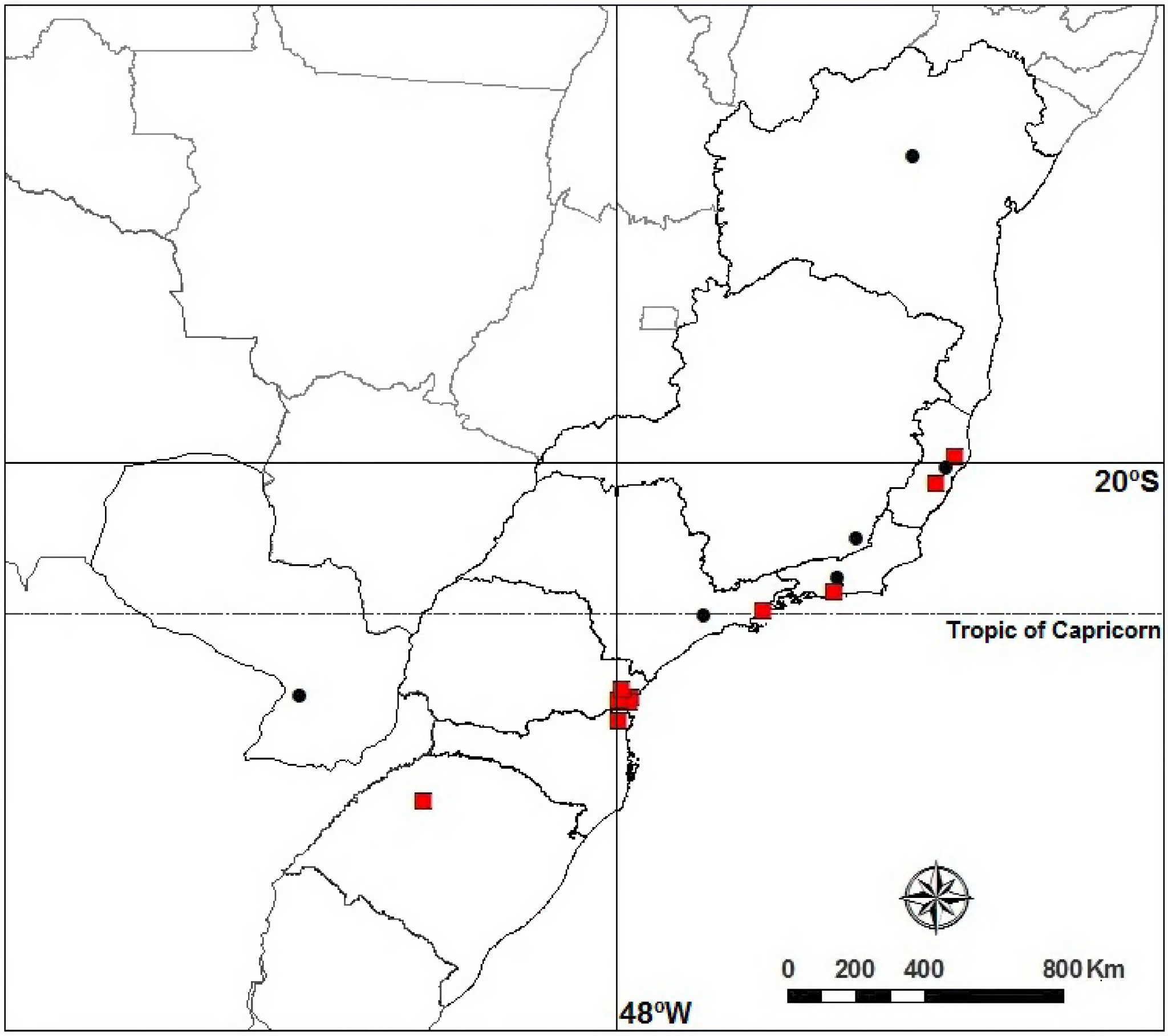


Figure 5. Distribution map of *Adelpha melona pseudarete* Fruhstorfer, 1915. Black circles are the records according to Willmott (2003). Red squares are the new records.

species with extremely few records and nothing is known about its biology. The aim of this study was to record new occurrences of *A. m. pseudarete* for South Brazil, and thus add to the knowledge of its geographical distribution and question of its supposed rarity.

Recently, *A. m. pseudarete* have been recorded in Floresta Estadual do Palmito (FEP) (25°35′ S, 04832′ W; altitude 1020 above sea level), a "sustainable use" protected area according to the Brazilian Environmental Law (SNUC 2000, law N° 9.985), located in Paranaguá municipality, in the coastal region of Paraná, about 12 km from the ocean. The FEP is located at the Atlantic Forest biome and is covered by lowland dense ombrophilous forest, pioneering formations with maritime (Restinga or "sand forest", composed by trees, marshes and shrubs), and fluvial–marine (mangrove) influences (IBGE 2012). According to the Köppen's classification,

Figure 6. Habitat of *Adelpha melona pseudarete*. Trail in Floresta Estadual do Palmito, Paranaguá, Paraná state, Brazil.

the climate is Cfa, humid subtropical with hot summer (Alvares et al. 2013). The average annual temperature and precipitation is about 22°C and 2,000 mm, respectively (Caviglione et al. 2000).

Specimens of *Adelpha* in the Coleção Entomológica Padre Jesus Santiago Moure, Departamento de Zoologia, Universidade Federal do Paraná (DZUP) were also studied.

A total of 11 new records of *A. m. pseudarete* were obtained, which increased the current knowledge of its natural distribution in about 900 km southwards (Figure 5). In FEP, males were founded perching along ridge tops from 3–10 m above the ground in a trail with large sunlit patches (Figure 6), mainly in the hottest hours of the day (11:30 h to 15:00 h). This behavior is common in nymphalid butterflies and has been recorded for several *Adelpha* species (Willmott 2003).

The other locations from Paraná state (Matinhos, Paranaguá and Pontal do Paraná municipalities) in which the species was recorded are also located in the coastal region and have a similar floristic composition as at FEP, composed by lowland dense ombrophilous forest with Restinga and/or mangroves. The southernmost record of the distribution of *A. m. pseudarete* is from Ijuí municipality, Rio Grande do Sul state, an ecotone of seasonal deciduous forest and grasslands, characterized by lowland forests and "banhados" (marsh environments) (Cordeiro and Hasenack 2009). Some old data obtained from the DZUP collection prevents accurate characterization of some sites.

The increase in number of occurrences suggests that the supposed rarity of *A. m. pseudarete* is a sampling effort artifact, because until now, there were no published distributional data of this subspecies from southern Brazil (Willmott 2003). Despite South Brazil having sites well-sampled (Santos et al. 2008; Siewert et al. 2014), it is important to prioritize areas with few, incomplete or no inventories. Thus, it is possible to increase the knowledge on the distributional patterns of butterflies and filling any remaining gaps.

Material examined

(Deposited in DZUP.) BRAZIL: Espírito Santo: Linhares, 15-20-IV-1974, 1 male, C. Elias *leg.*, DZ 29.883; 13-V-1974, 1 male, C. Elias *leg.*, DZ 29.933; VI-1975, 1 female, C. Elias *leg.*,DZ 29.953; I-1978, 1 male, C. Elias *leg.*, DZ 29.533; (Delta des Rio Doce), 25m, 18-25-II-1975, 1 female, H. & H. D. Ebert *leg.*, DZ 29.493; Santa Tereza, I-1968, 1 female, DZ 29.503; Santa Leopoldina – (Cachoeira de Santa Leopoldina), 3-II-1950, 1 female, A. Gentili *leg.*, DZ 29.903. Goiás: Goiânia – (Campinas), 1-I-1936, 1 male, H. P. Lopes *leg.*, DZ 29.553; Rio de Janeiro: Rio de Janeiro, 1 male, DZ 29.683; 10-XI-1945, 1 male, Gagarin *leg.*, DZ 29.573; (Covanca de Jacarepaguá), 22-II-1929, 1 male, Ferreira d'Almeida *leg.*, DZ 29.873. São Paulo: Ubatuba, 10m, 15-V-1970, 1 female, H. R. Ebert *leg.*, DZ 29.653. Paraná: Matinhos, 21-IV-1978, 1 female, DZ 29.843; Paranaguá – (Floresta Estadual do Palmito), 10-20m, 15-XI-2008, 1 male, O. Mielke *leg.*, DZ 29.913; 12-13-II-2014, 2 females, Leviski, Queiroz-Santos & Siewert *leg.*, DZ. 30.894, DZ. 30.895; 16-17-VII-2014, 1 male, Leviski, Siewert & Queiroz-Santos *leg.*, DZ. 30.896; 25-26-VIII-2014, 4 males, Leviski, Queiroz-Santos & Santos *leg.*, DZ. 30.897, DZ. 30.898, DZ. 30.899, DZ. 30.900. Pontal do Paraná – (Atami), 10m, 26-31-XII-2004, 3 males, Mielke *leg.*, DZ 29.563, DZ 29.803, DZ 29.983; 10m, 26-31-XII-2007, 1 male, Mielke *leg.*, DZ 29.633; 30-XII-2010, 1 male, Mielke *leg.*, DZ 29.703; (Rio Guaraguatá), 19-IV-2009, 1 male, Mielke *leg.*DZ 29.953. *Santa Catarina*: Joinville, 10-200m, 4-II-1973, 1 male, Miers *leg.*, DZ 29.603; 10-200m, 22-IV-1973, 1 male, Mielke & Miers *leg.*, DZ 29.823; 10-200m, 6-XI-1977, 1 male, Miers *leg.*, DZ 29.743; 10-200m, 27-VII-1978, 1 male, Mielke & Miers *leg.*, DZ 29.923; 10-200m, 30-XI-1979, 1 female, Mielke & Miers *leg.*, DZ 29.513; 4-V-1980, 1 male, H. Miers *leg.*, DZ 29.643; 1 male, H. Miers, H.& K. Ebert *leg.* DZ 29.783. Rio Grande do Sul: Ijuí, 25-II-2007, 1 male, F. L. Santos *leg.*, DZ 29.543.

ACKNOWLEDGEMENTS

G.L.L (fellowship 134752/2013-9), L.Q.S (130624/2014-4), R.R.S (140223/2013-4), M.M.C (308247/2013-2) and O.H.H.M. (304639/2014-1) thank the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) for the support. L.M.G.S (fellowship 2012-03-02-D/UFPR) thanks the Coordenação de Aperfeiçoamento de Pessoal de Nível Superior (CAPES) for the fellowship granted. We thank the anonymous reviewer and to Cristiano Agra Iserhard for the valuable suggestions; the Instituto Ambiental do Paraná (IAP) for permits (N° 011.14); and finally, Aneuri Moreira Lima, Angela de Almeida Prado, Eurisvaldo Alves and Ellen Cristina da Silva Moreira Lima for the access to the Floresta Estadual do Palmito.

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Authors' contribution statement: GLL, LQS, RRS and LMGS designed of the study, performed the data collection, identified all material, and drafted the manuscript. MMC and OHHM provide data from the DZUP collection and revised the text.

Received: 1 November 2014
Accepted: 9 June 2015
Academic editor: Cristiano A. Iserhard